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**Ensemble Real Estate Investments**

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**DRAFT**  
**AIR QUALITY TECHNICAL REPORT –**  
**CONSTRUCTION**  
**TASMAN EAST – THE STATION (PARCELS 19 & 29)**  
**SANTA CLARA, CALIFORNIA**

## CONTENTS

<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Project Understanding	1
<b>2.</b>	<b>EMISSIONS ESTIMATES</b>	<b>3</b>
2.1	Off-road Equipment	3
2.2	On-road Mobile Sources	4
2.3	Architectural Coating Sources	4
<b>3.</b>	<b>ESTIMATED AIR CONCENTRATIONS</b>	<b>6</b>
3.1	Chemical Selection	6
3.2	Air Concentration Averaging Period	6
3.3	Dispersion Modeling	7
3.4	Meteorological Data	7
3.5	Terrain Considerations	7
3.6	Emission Rates	7
3.7	Source Parameters	8
3.8	Receptors	8
<b>4.</b>	<b>RISK CHARACTERIZATION METHODS</b>	<b>9</b>
4.1	Exposure Assessment	9
4.2	Toxicity Assessment	10
4.3	Age Sensitivity Factors	10
4.4	Estimation of Cancer Risks	10
4.5	Estimation of Chronic Non-Cancer Hazard Quotients/Indices	11
<b>5.</b>	<b>RESULTS</b>	<b>12</b>
5.1	Criteria Air Pollutants	12
5.2	Project Level Health Risk Assessment	12
<b>6.</b>	<b>REFERENCES</b>	<b>13</b>

**TABLES**

Table 1:	Project Land Uses
Table 2:	Project Construction Schedule
Table 3:	Project Construction Diesel Equipment List
Table 4:	Project Construction Trips
Table 5:	Project Construction Architectural Coating
Table 6:	Model Source Parameters
Table 7:	Construction Model Emissions
Table 8:	Exposure Parameters
Table 9:	Carcinogenic and Noncarcinogenic Toxicity Values
Table 10:	Age Sensitivity Factor
Table 11:	Construction Criteria Air Pollutant Emissions
Table 12:	Maximum Project Excess Lifetime Cancer Risk, Chronic HI, and PM <sub>2.5</sub> Concentration on Offsite and Onsite Receptors

**FIGURES**

Figure 1:	Project Location and Construction Sources
Figure 2:	Receptor Locations

## ACRONYMS AND ABBREVIATIONS

ACC	Advanced Clean Cars
AERMET	Atmospheric Meteorological Data Processor
AERMOD	Atmospheric Dispersion Model
ARB	California Air Resources Board
ASFs	Age Sensitivity Factors
BAAQMD	Bay Area Air Quality Management District
CalEEMod®	California Emissions Estimator Model
CAP	Criteria Air Pollutant
CEQA	California Environmental Quality Act
CPF	Cancer Potency Factor
cREL	Chronic Reference Exposure Level
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EF	Emission Factor
EPA	Environmental Protection Agency
g/s	Gram Per Second
HHDT	Heavy Heavy Duty Truck
HI	Hazard Indices
HQ	Hazard Quotient
HRA	Health Risk Impacts
KOAK	Air Data Was Obtained from The Oakland International Airport
KSJC	Meteorological Data from The San Jose International Airport
Lb	Pound
LDA	Light-Duty Automobiles
LDT1	Light-Duty Trucks 1
LDT2	Light-Duty Trucks 2
m <sup>3</sup>	cubic meter
mg	milligram
MHDT	Medium Heavy Duty Truck
NED	National Elevation Dataset
NO <sub>x</sub>	Nitrogen Oxides

NWS	National Weather Service
OEHHA	Office of Environmental Health Hazard Assessment
PM <sub>10</sub>	Fine Particulate Matter Less Than 10 Microns in Aerodynamic Diameter
PM <sub>2.5</sub>	Fine Particulate Matter Less Than 2.5 Microns in Aerodynamic Diameter
ROG	Reactive Organic Compounds
SCAQMD	South Coast Air Quality Management District
Sqft	square foot
TAC	Toxic Air Contaminants
TSD	Technical Support Document
USGS	United States Geological Survey
VOC	Volatile Organic Compound
x/Q	chi over q
µg/m <sup>3</sup>	microgram per cubic meter

## EXECUTIVE SUMMARY

The Project consists of the redevelopment of two adjacent lots (Parcel 19 and Parcel 29) in the Station district in the Tasman East area in Santa Clara, California (the "Project"). Parcel 19 is approximately 1.87 acres and is bound by Calle De Luna to the North and Calle Del Sol to the West. Parcel 29 is approximately 0.75 acres and is bound by Calle Del Sol to the West and Tasman Blvd. to the South. The Project proposes the replacement of an existing one-story building on Parcel 19 with a mid-rise building consisting of 311 residential units (280,700 sq. ft.), 15,790 sq. ft. of retail and 443 parking spaces (178,800 sq. ft.). The mid-rise building to be located on Parcel 19 will be 8-stories with one basement level. On Parcel 29, the Project will replace an existing one-story building and a surface parking lot with a high-rise building consisting of retail and residential units. Parcel 29 will include 192 residential units (237,905 sq.ft.), 8,000 sq.ft. of retail and 139 parking spaces (57,760 sq. ft.). The high-rise building on Parcel 29 will be 20-stories with above grade parking. The Station District within the Tasman East Area also has two other parcels that are not considered part of the Project (those parcels include parcel 30 and parcel 56 which are located at 2207 Tasman Drive and 2121 Tasman Drive, respectively). These two other parcels are considered "off-site" receptors for the purpose of this analysis.

The Project is being developed under the Tasman East Specific Plan. The Environmental Impact Report (EIR) for the Tasman East Specific Plan was certified November 13, 2018 (SCH # 2016122027). The EIR includes a mitigation measure for construction impacts as MM AQ-1.2, which requires a project-level analysis of construction Criteria Air Pollutant (CAP) emissions and health risks and hazards.

In this report, Ramboll evaluates cancer risk and chronic hazard indices (HI) from construction equipment Toxic Air Contaminants (TACs), in addition to CAP emissions and fine particulate matter less than 2.5 microns in aerodynamic diameter (PM<sub>2.5</sub>) concentrations on existing sensitive receptors to evaluate consistency with MM AQ-1.2 of the Specific Plan EIR.

Ramboll used California Emissions Estimator Model (CalEEMod®) (Version 2016.3.2) equivalent methodologies to calculate off-road construction equipment emissions, on-road emissions, and architectural coating emissions. Air dispersion modeling with atmospheric dispersion modeling (AERMOD) was used to estimate ambient air concentrations. Finally, health risk impacts were calculated using the 2015 Office of Environmental Health Hazard Assessment (OEHHA) Guideline. The Bay Area Air Quality Management District (BAAQMD) significance thresholds were used to compare the results of the analyses, as required in MM AQ-1.2.

Construction emissions assume equipment engine tier levels based on information provided by the Project Sponsor and discussed in Section 2.1. As discussed in that section, the following equipment is known to have specific engine tiers.

- Tier 3 engines
  - Crane during building construction of Parcel 19
- Tier 4 (or Tier 4 equivalent) engines
  - Forklifts during building construction of both Parcel 19 and 29
  - Generator sets during building construction of both Parcel 19 and 29
  - Tractors/Loaders/Backhoes during building construction of Parcel 29
- Electric equipment
  - Crane during building construction of Parcel 29

In an effort to reduce exposure to construction emissions to future residents, the Project Sponsor has also committed to using a Tier 4 (or Tier 4 equivalent) crane during construction of the midrise building if the two off-site parcels within the Station District (i.e., parcels 30 and 56) are developed and occupied by new residences prior to or during construction of Parcel 19, due to the proximity of these parcels to the Project. It is not known at this time if these off-site parcels will be built before the Project or whether the redevelopment of these parcels with new residential receptors is reasonably foreseeable, but this analysis nonetheless addresses a scenario in which they are redeveloped prior to construction of the Project in order to be as conservative as possible.

As outlined in **Section 4**, construction reactive organic compounds (ROG), nitrogen oxides (NO<sub>x</sub>), fine particulate matter less than 10 microns in aerodynamic diameter (PM<sub>10</sub>), and PM<sub>2.5</sub> emissions are below the BAAQMD significance thresholds for construction related average daily emissions.

With the equipment engine commitments described above, the total project construction cancer risks, chronic HI, and PM<sub>2.5</sub> concentrations are all below the corresponding project level BAAQMD significance thresholds for health risks and hazards.

Table ES-1: Summary of Project Emissions and Impacts				
	Units	Project	Threshold	Exceed Threshold?
Maximum Construction Emissions				
ROG	lb/day	39	54	No
NO <sub>x</sub>		6.0	54	No
PM <sub>10</sub>		0.34	82	No
PM <sub>2.5</sub>		0.22	54	No
Construction Health Impacts on Off-site Receptors				
Excess Lifetime Cancer Risk	in a million	9.1	10	No
Chronic Hazard Index	Unitless	0.014	1	No
PM <sub>2.5</sub> Concentration	µg/m <sup>3</sup>	0.034	0.3	No
Construction Health Impacts on On-site Station Receptors				
Excess Lifetime Cancer Risk	in a million	6.6	10	No
Chronic Hazard Index	Unitless	0.0097	1	No
PM <sub>2.5</sub> Concentration	µg/m <sup>3</sup>	0.031	0.3	No
Construction Health Impacts on Off-site Station Receptors <sup>1</sup>				
Excess Lifetime Cancer Risk	in a million	8.4	10	No
Chronic Hazard Index	Unitless	0.025	1	No
PM <sub>2.5</sub> Concentration	µg/m <sup>3</sup>	0.054	0.3	No

<sup>1</sup> It is not reasonably foreseeable that redevelopment of the two other parcels located within the Station District, which are not a part of the Project, will occur prior to construction of the Project. However, for informational purposes, this analysis contains an assessment of potential construction health risk impacts under a scenario in which these two offsite parcels have sensitive receptors during construction of the Project.

## 1. INTRODUCTION

Ramboll US Corporation (“Ramboll”) prepared this Air Quality Analysis Technical Report for the Station project in Santa Clara, CA (“Project”) to present an analysis of projected construction emissions from the Project and estimates potential health risks associated with Project construction.

The Project is being developed under the Tasman East Specific Plan. The EIR for the Tasman East Specific Plan was certified November 13, 2018 (SCH # 2016122027). The EIR includes a mitigation measure for construction impacts as MM AQ-1.2, which requires a project-level analysis of construction CAP emissions and health risks and hazards and is copied below.

MM AQ-1.2: Construction criteria pollutant and TAC quantification will be required on a project-level basis for individual development projects once those details are available through modeling to identify impacts and, if necessary, include measures to reduce emissions. The analysis must be submitted for City review and approval, once complete. Health risks from construction TACs shall be reduced below 10 in one million excess cancer cases, a hazard index of 1.0, and PM<sub>2.5</sub> emissions of 0.3 µg/m<sup>3</sup>. Criteria pollutant emissions shall not exceed BAAQMD construction criteria pollutant emissions thresholds. Reduction in emissions can be accomplished through, though is not limited to, the following measures:

- Construction equipment selection for low emissions;
- Use of alternative fuels, engine retrofits, and added exhaust devices;
- Low-Volatile Organic Compound (VOC) paints;
- Modify construction schedule; and
- Implementation of BAAQMD Basic and/or Additional Construction Mitigation Measures for control of fugitive dust.

The analysis in this report is intended to demonstrate compliance with MM AQ-1.2. It includes an evaluation of CAP emissions and TAC emissions and then compares these emissions against relevant BAAQMD thresholds. The health risk assessment (HRA) estimates potential health impacts at off-site and on-site sensitive receptors from exposure to Project construction emissions. This report describes the methodology used to estimate Project construction emissions, air dispersion modeling of those emissions to off-site and on-site locations, and estimation of potential health risk impacts associated with exposure to these emissions.

### 1.1 Project Understanding

The Project is a mixed-use development consisting of two parcels (Parcel 19 and Parcel 29) located in the East Tasman area in Santa Clara, California. Both parcels include development of residential units and retail spaces. Parcel 19 includes the construction of a mid-rise building with residential units from level 3 onwards with potential residents on floors 1 and 2 through “live-work” spaces. Parcel 29 will be redeveloped with a high-rise building and would have residential units from level 5 onwards. Parcel 29 is also located directly opposite to the Lick Mill Light Rail Station (refer to Figure 1). There would be no stationary sources of air emissions associated with the development (e.g., emergency generators). Ramboll understands that the existing buildings on-site will be demolished at the start of each Parcel’s phased construction. **Table 1** provides the land use information used for this analysis.

The Station District also contains two other parcels that are not part of the Project but are considered “off-site” for the purpose of this analysis, as discussed above.

## 2. EMISSIONS ESTIMATES

Ramboll estimated CAP and TAC emissions from the Project construction. Construction emission calculation methodologies cover off-road equipment (primarily diesel-fueled), on-road vehicles, and area sources such as architectural coatings. Calculation methodologies for each type of emissions are described separately below. The construction schedule for the Project was provided by the Project Sponsor and is shown in **Table 2**.

### 2.1 Off-road Equipment

This analysis uses the default construction equipment inventory provided by CalEEMod® for the size of the Project buildings. Defaults include the type, quantity, schedule, and hours of operation anticipated for each piece of equipment for each construction phase.

Ramboll used CalEEMod® equivalent methodologies to estimate emissions from off-road equipment. The CalEEMod® emissions methodology for off-road construction equipment relies on the California Air Resources Board (ARB) In-Use Off-Road Equipment model (OFFROAD2011), which incorporates statewide survey data to develop emission factors based on the fleet average for each year of construction.<sup>2</sup> CalEEMod® default values from OFFROAD2011 are used. Load factors for each piece of equipment are based on the default load factor in OFFROAD2011, which are included in CalEEMod® (South Coast Air Quality Management District (SCAQMD), 2016). Default emission factors from OFFROAD2011 assumes fleet average equipment engine tiers, meaning the emission factors used reflect the fleet predicted to be in use at a particular year in the OFFROAD2011 model. These default emission factors were used to calculate the Project construction emissions. A select few pieces of equipment will have Tier 3 or 4 engines. The equipment list used in this analysis is shown in **Table 3**.

The following equipment is known to have specific engine tiers.

- Tier 3 engines
  - Crane during building construction of Parcel 19
- Tier 4 (or Tier 4 equivalent) engines
  - Forklifts during building construction of both Parcel 19 and 29
  - Generator sets during building construction of both Parcel 19 and 29
  - Tractors/Loaders/Backhoes during building construction of Parcel 29
- Electric equipment
  - Crane during building construction of Parcel 29

In an effort to reduce exposure to construction emissions to future residents, the Project Sponsor has also committed to using a Tier 4 (or Tier 4 equivalent) crane during construction of the midrise building if the remainder of the Station District (i.e., parcels 30 and 56) are redeveloped and occupied with residential uses prior to construction on Parcel 19, due to the proximity of these parcels to the Project.

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<sup>2</sup> OFFROAD2017 is the latest version of the ARB in-use off-road equipment model. However, as the current version of CalEEMod® still uses the OFFROAD2011 emission factors. To be consistent with CalEEMod, OFFROAD2011 was used in this analysis.

## 2.2 On-road Mobile Sources

On-road vehicle emissions are calculated using CalEEMod® equivalent methodologies. Regional default trip lengths from CalEEMod® are used for comparison of emissions to the BAAQMD California Environmental Quality Act (CEQA) mass emission thresholds. For estimating the emissions for use in the health risk assessment, the trip distance near the site was used. CalEEMod® assumes the worker fleet is assumed to be 50% Light-Duty Automobiles (LDA), 25% Light-Duty Trucks 1 (LDT1) and 25% Light Duty Trucks 2 (LDT2). Likewise, CalEEMod® assumes a vendor fleet mix of 50% Medium Heavy Duty Trucks (MHDT) and 50% Heavy Heavy Duty Trucks (HHDT) and hauling trips are 100% HHDT. The Project Sponsor provided trip counts which are shown in **Table 4**. The worker fleet was assumed to be gasoline-powered while the vendor and hauling fleets were assumed to be diesel-powered.

The emission factors for emissions for criteria pollutants in CalEEMod® are from EMFAC2017 desktop version, released in March 2018. EMFAC2017 was run in emissions mode for Santa Clara County for years 2020-2025 and annual emissions were output by pollutant and emissions process type and aggregated over model year and speed. Emission factors were calculated using the vehicle miles traveled and trip output files to get units of g/mile and g/trip.

The emission factors used for construction of the Project cover the years 2020 to 2025, the anticipated years of construction. If project construction starts later and lasts beyond 2025, the emissions calculated in this analysis will still be more conservative (greater) since California's vehicle fleet is expected to become cleaner over time. EMFAC2017 reflects the emissions benefits of ARB rulemakings including on-road diesel fleet rules, Pavley Clean Car Standards, and the Advanced Clean Cars (ACC) program.

## 2.3 Architectural Coating Sources

VOC or ROG off-gassing emissions result from evaporation of solvents contained in surface coatings. The program calculates the VOC evaporative emissions from application of residential and non-residential surface coatings using the following equation.

$$E_{AC} = EF_{AC} \times F \times A_{\text{paint}}$$

Where:

E	=	emissions (pound (lb) VOC)
EF	=	emission factor (lb/square foot (sqft))
A	=	building surface area (sqft). The total surface for painting was assumed to equals 2.7 times the floor square footage for residential and 2 times that for non-residential square footage. All of the land use information provided by a metric other than square footage was converted to square footage using the default conversions or user defined equivalence.
F	=	fraction of surface area. The default values based on SCAQMD methods used in their coating rules are 75% for the exterior surface and 25% for the interior.

The emission factor (EF) is based on the VOC content of the surface coatings and is calculated estimated using the equation below:

$$EF_{AC} = C_{VOC}/454(g/lb) \times 3.785(L/gal)/180*sqft)$$

Where:

EF = emission factor (lb/sqft)

C = VOC content gram per liter

The emission factors for coating categories were calculated using the equation above based on default VOC content provided by the air districts or CARB's statewide limits in CalEEMod®. The emissions associated with architectural coating shown in **Table 5**.

### 3. ESTIMATED AIR CONCENTRATIONS

Project construction activities will generate emissions that will be transported outside of the physical boundaries of the Project, potentially impacting nearby residential areas. Methodologies to estimate concentrations resulting from Project emissions are provided below.

#### 3.1 Chemical Selection

The cancer risk analysis in the construction HRA is based on diesel particulate matter (DPM) concentrations from diesel equipment and on-road vehicles.<sup>3</sup> Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen (California Environmental Protection Agency [Cal/EPA] 1998). Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole (Cal/EPA 2014). Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole because the identity of all chemicals in the mixture may not be known or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that “potential cancer risk from inhalation exposure to whole diesel exhaust will exceed the multi-pathway cancer risk from the speciated components (Cal/EPA 2003).” The analysis of DPM for this Project is based on the surrogate approach, as recommended by Cal/EPA.

For sources of diesel exhaust, cancer risks tend to approach thresholds at lower concentrations of diesel exhaust than for acute non-cancer hazard index due to the toxic profile of the exhaust. In other words, if the cancer risk is below thresholds, the acute non-cancer hazard index will also be below thresholds. Annual average concentrations of DPM were modeled and non-cancer acute index from diesel exhaust was not separately estimated in this report.

BAAQMD also has a threshold for annual average fine particulate matter less than 2.5 microns in aerodynamic diameter ( $PM_{2.5}$ ) concentration.  $PM_{2.5}$  is a complex mixture of substances that includes elements such as carbon and metals; compounds such as nitrates, organics, and sulfates; and complex mixtures such as diesel exhaust and wood smoke.  $PM_{2.5}$  poses an increased health risk relative to fine particulate matter less than 10 microns in aerodynamic diameter ( $PM_{10}$ ) because the particles can deposit more deeply in the lungs and they contain substances that are particularly harmful to human health. It can cause a wide range of health effects including aggravating asthma and bronchitis, causing visits to the hospital for respiratory and cardiovascular symptoms, and contributing to heart attacks and deaths.

#### 3.2 Air Concentration Averaging Period

For the HRA, project construction was assumed to occur over a 2.5-year period starting in 2020 for Parcel 19 and a 2.5-year period starting in 2023 for Parcel 29. Annual average

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<sup>3</sup> Workers trip produced a few speciated organic compounds that are considered toxic air contaminants. However, the number of worker trips is not large enough (less than an average of 170 cars a day) to generate significant impacts. For reference, the BAAQMD considers traffic of less than 10,000 vehicles per day to be minor and low impact source of TACs. Therefore, they are not included in this study.

concentrations were estimated for construction analysis (for cancer risk, chronic Hazard Indices (HI), and PM<sub>2.5</sub> concentration); maximum hourly concentrations were not modeled as health impacts from diesel exhaust were driven by chronic exposure for cancer risk, as described above.

### 3.3 Dispersion Modeling

Near-field air dispersion modeling of DPM and PM<sub>2.5</sub> from Project construction sources was conducted using the USEPA atmospheric dispersion modeling (AERMOD) model, version 18081 (USEPA 2004). For each receptor location, the model generated average air concentrations that resulted from the emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. When site-specific information is unknown, Ramboll used default parameter sets that are designed to produce conservative (i.e., overestimated) air concentrations.

### 3.4 Meteorological Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the Project under consideration. For this analysis, meteorological data from the San Jose International Airport (KSJC) National Weather Service (NWS) station for years 2009 through 2013 were used. Upper air data was obtained from the Oakland International Airport (KOAK). The data were processed using the latest versions of Atmospheric Meteorological Data Processor (AERMET) (Version 18081 [USEPA 2018]) and associated preprocessors. A detailed analysis of monthly precipitation was performed in accordance with BAAQMD guidelines for developing a monthly land use profile.

### 3.5 Terrain Considerations

Elevation data (1-arc second) was imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey (USGS). An important consideration in an air dispersion modeling analysis is the selection of rural or urban dispersion coefficients. Based on the urban area in which the Project would be located, Ramboll used urban dispersion coefficients.

### 3.6 Emission Rates

Emitting activities are modeled to reflect the actual hours of construction. Emissions are modeled using the  $x/Q$  ("chi over q") method, such that the modeled source has a unit emission rate (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors with units of microgram per cubic meter per gram per second [ $\mu\text{g}/\text{m}^3$ ]/[g/s].

For annual average ambient air concentrations, the estimated annual average dispersion factors are multiplied by the annual average emission rates. The emission rates will vary day to day, with some days having no emissions (e.g., weekends during project construction). The model assumes a constant emission rate during the entire year, which is appropriate for developing annual average concentrations. **Table 6** shows the toxic air contaminant emission rates used in the analysis.

Modeled construction activities restrict meteorological hours of the day from 7:00 AM to 5:00 PM, the likely hours for emissions to occur. This way, only representative meteorological data was considered in determining the dispersion factors. Emission rates are adjusted such that on average unit emission rates are modeled, i.e., 1 g/s for 24 hours a day, 7 days a week.

Thus, the model will provide an annual average concentration that can be incorporated directly into the health risk calculations assuming 24 hours of daily exposure.

### 3.7 Source Parameters

Source locations and release parameters are necessary to model the dispersion of air emissions from activities associated with the Project. Construction off-road sources were modeled as adjacent volume sources that overlay the entire Project site. Construction on-road sources were modeled as line sources along Calle Del Sol, Calle De Luna, and Lafayette Street.

**Table 7** summarizes the source parameters associated with the construction activities. Emissions were distributed uniformly throughout the construction site. **Figure 1** shows the construction sources.

### 3.8 Receptors

Receptors are located on off-site areas within 1,000 feet of the Project. Receptors were modeled at a height of 1.8 meters above terrain height, as recommended in BAAQMD guidance (BAAQMD 2017). A receptor grid with 20-meter spacing was placed over all off-site locations out to 1000 feet from the Project area. As discussed previously, average annual dispersion factors were estimated for each receptor location. All modeled receptor locations are shown in **Figure 2**.

For this analysis, it was conservatively assumed that the remainder of the Tasman East Specific Plan was built out and residential receptors would be exposed to construction emissions from Parcels 19 and 29 according to the scenarios in **Section 4.1**.

## 4. RISK CHARACTERIZATION METHODS

Potential health impacts from the Project are evaluated upon sensitive receptors near the Project. This report assesses risk to sensitive receptors using the 2015 CalEPA OEHHA guidance.

### 4.1 Exposure Assessment

The methodology under OEHHA 2015 Hot Spots Guidelines is as follows:

***Potentially Exposed Populations:*** This HRA evaluates Project related construction health impacts on off-site and on-site sensitive receptors. For this analysis, all sensitive receptors were all assumed to be residential receptors to be conservative. Residential exposure results in highest estimated health impacts due to the continuous exposure to TACs. **Figure 2** shows the locations for the receptors.

***Exposure Assumptions:*** The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations were obtained using risk assessment guidelines from OEHHA (Cal/EPA 2015) and BAAQMD (2016c) and are presented in **Table 8**. This analysis considered two scenarios in order to capture the maximum impact of the Project:

- **Scenario 1:** exposure starting at the beginning of construction of the midrise building and exposure to construction emissions for both buildings (off-site receptors only).
- **Scenario 2:** Exposure starting at the beginning of construction of the highrise building and no exposure to the midrise building construction (off-site receptors and on-site receptors in the midrise building).

***Calculation of Intake:*** The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation,  $IF_{inh}$ , can be calculated as follows:

$$IF_{inh} = \frac{DBR * FAH * EF * ED * CF}{AT}$$

Where:

$IF_{inh}$	=	Intake Factor for Inhalation ( $m^3/kg\text{-day}$ )
DBR	=	Daily Breathing Rate ( $L/kg\text{-day}$ )
FAH	=	Frequency of time at Home (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 ( $m^3/L$ )

The chemical intake or dose is estimated by multiplying the inhalation intake factor,  $IF_{inh}$ , by the chemical concentration in air,  $C_i$ . When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the current OEHHA Hot Spots guidance (Cal/EPA 2015).

## 4.2 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and non-cancer endpoints. Toxicity values that are used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment. For cancer risk and chronic HI calculations, the toxicity values used for DPM are summarized in **Table 9**.

## 4.3 Age Sensitivity Factors

The estimated excess lifetime cancer risks for a child were adjusted using age sensitivity factors (ASFs) that account for an “anticipated special sensitivity to carcinogens” of infants and children as recommended in the OEHHA Technical Support Document (TSD) (Cal/EPA 2009) and OEHHA 2015 Hot Spots guidance (Cal/EPA 2015). Cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an Age Sensitivity Factor (ASF) of one, which is equivalent to no adjustment) was applied to ages 16 and older. This approach is also recommended by BAAQMD in its most recent Air Toxics NSR Program HRA Guideline (BAAQMD 2016c).

**Table 10** shows the age sensitivity factors used in this analysis.

## 4.4 Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$\text{Risk}_{\text{inh}} = C_i \times CF \times \text{IF}_{\text{inh}} \times \text{CPF}_i \times \text{ASF}$$

Where:

$\text{Risk}_{\text{inh}}$	=	Cancer Risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
$C_i$	=	Annual Average Air Concentration for Chemical <sub>i</sub> ( $\mu\text{g}/\text{m}^3$ )
CF	=	Conversion Factor ( $\text{mg}/\mu\text{g}$ )
$\text{IF}_{\text{inh}}$	=	Intake Factor for Inhalation ( $\text{m}^3/\text{kg}\cdot\text{day}$ )
$\text{CPF}_i$	=	Cancer Potency Factor for Chemical <sub>i</sub> ( $\text{mg chemical}/\text{kg body weight}\cdot\text{day}$ ) <sup>-1</sup>
ASF	=	Age Sensitivity Factor (unitless)

#### 4.5 Estimation of Chronic Non-Cancer Hazard Quotients/Indices

The potential for exposure to result in adverse chronic non-cancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the non-cancer chronic reference exposure level (cREL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding a HI. DPM is the only pollutant evaluated for chronic non-cancer hazard in this HRA; therefore, the HQ for DPM is the same as the overall HI.

$$HQ_i = C_i / cREL_i$$

$$HI = \sum HQ_i$$

Where:

$HQ_i$	=	Chronic hazard quotient for chemical <sub>i</sub>
HI	=	Hazard index
$C_i$	=	Annual average concentration of chemical <sub>i</sub> (µg/m <sup>3</sup> )
$cREL_i$	=	Chronic non-cancer reference exposure level for chemical <sub>i</sub> (µg/m <sup>3</sup> )

## 5. RESULTS

### 5.1 Criteria Air Pollutants

CAP emissions from Project construction are shown in **Table 11**. Total construction emissions as well as emissions by source category are shown. **Table 11** also shows the comparison between the total construction emissions against the daily average criteria air pollutant emission BAAQMD significant thresholds. The maximum daily average  $\text{NO}_x$  emissions are 6.0 pounds per day (lbs/day), ROG emissions are 39 lbs/day,  $\text{PM}_{10}$  emissions are 0.34 lbs/day and  $\text{PM}_{2.5}$  emissions are 0.22 lbs/day. The Project criteria air pollutant emissions are below applicable BAAQMD significant thresholds.

### 5.2 Project Level Health Risk Assessment

A construction risk assessment was conducted for the Project. **Table 12** shows the construction health risk impacts at the off-site and on-site maximally exposed individual sensitive receptor. The total project construction cancer risks, chronic HI, and  $\text{PM}_{2.5}$  concentrations are all below the corresponding project level BAAQMD significance thresholds for health risks.

For an off-site resident, the maximum calculated cancer risk was 9.1 in a million, maximum calculated chronic HI was 0.014, and the maximum calculated  $\text{PM}_{2.5}$  concentration was  $0.034 \text{ ug/m}^3$ .

For an on-site Station resident, the maximum calculated cancer risk was 6.6 in a million, maximum calculated chronic HI was 0.0097, and the maximum calculated  $\text{PM}_{2.5}$  concentration was  $0.031 \text{ ug/m}^3$ .

For an “off-site” Station resident, the maximum calculated cancer risk was 8.4 in a million, maximum calculated chronic HI was 0.025, and the maximum calculated  $\text{PM}_{2.5}$  concentration was  $0.054 \text{ ug/m}^3$ . If the off-site portion of The Station is built out directly southeast of the Project (parcels 30 or 56) before Parcel 19 construction begins, the Project sponsor has committed to using a Tier 4 (or Tier 4 equivalent) crane in order to ensure a less-than-significant impact. The cancer risk noted here for the “off-site” Station resident assumes a Tier 4 (or Tier 4 equivalent) crane was used.

## 6. REFERENCES

- BAAQMD 2017. California Environmental Quality Act Air Quality Guidelines. May. Available online at: [http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa\\_guidelines\\_may2017-pdf.pdf?la=en](http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en)
- California Environmental Protection Agency (Cal/EPA). 1998. Findings of the Scientific Review Panel on The Report on Diesel Exhaust, as adopted at the Panel's April 22, 1998, meeting. Available online at: <http://www.arb.ca.gov/toxics/dieseltac/de-fnds.htm>.
- Cal/EPA. 2003. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment (OEHHA). August. Available online at: [http://oehha.ca.gov/air/hot\\_spots/hraguidefinal.html](http://oehha.ca.gov/air/hot_spots/hraguidefinal.html).
- Cal/EPA. 2009. Technical Support Document for Cancer Potency Factors: Methodologies for Derivation, Listing of Available Values, and Adjustment to Allow for Early Life Stage Exposures. May. Available online at: [http://oehha.ca.gov/air/hot\\_spots/2009/TSDCancerPotency.pdf](http://oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf).
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- Cal/EPA. 2015. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. February. Available online at: [http://oehha.ca.gov/air/hot\\_spots/hotspots2015.html](http://oehha.ca.gov/air/hot_spots/hotspots2015.html).
- South Coast Air Quality Management District (SCAQMD). 2016. California Emissions Estimator Model (CalEEMod). Version 2016.3.2. Available online at: <http://www.caleemod.com/>
- United States Environmental Protection Agency (USEPA). 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. September. Available online at: [http://www.epa.gov/scram001/dispersion\\_prefrec.htm](http://www.epa.gov/scram001/dispersion_prefrec.htm)
- USEPA. 2018. AERMET – Version 18081. Available at: [https://www3.epa.gov/ttn/scram/metobsdata\\_procaccprogs.htm#aermet](https://www3.epa.gov/ttn/scram/metobsdata_procaccprogs.htm#aermet)

**DRAFT**

The Station – East Tasman  
Air Quality Technical Report – Construction Analysis

## **TABLES**

**Table 1**  
**Project Land Uses**  
**The Station - East Tasman**  
**Santa Clara, CA**

Parcel	Land Use Type <sup>1</sup>	Size	Units
Parcel 19	Retail	15,790	ft <sup>2</sup>
	Apartment Mid Rise	311	DU
	Parking	443	Spaces
Parcel 29	Retail	8,000	ft <sup>2</sup>
	Apartment High Rise	192	DU
	Parking	139	Spaces

**Notes:**

<sup>1</sup>. Project land uses for parcels were provided by the Project Sponsor.

**Abbreviations:**

DU - Dwelling Unit

ft<sup>2</sup> - square feet

**Table 2**  
**Project Construction Schedule**  
**The Station - East Tasman**  
**Santa Clara, CA**

Parcel	Construction Subphase	Start Date	End Date	Calendar Year	Number of Days <sup>2</sup>
Parcel 19 <sup>1</sup>	Demolition	1/1/2020	1/28/2020	2020	19
	Site Preparation	2/3/2020	2/14/2020	2020	10
	Grading	2/2/2020	3/27/2020	2020	29
	Building Construction	3/30/2020	6/3/2022	2020-2022	549
	Architectural Coating	11/2/2021	6/3/2022	2021-2022	145
Parcel 29 <sup>1</sup>	Demolition	1/1/2023	1/14/2023	2023	10
	Site Preparation	1/16/2023	2/3/2023	2023	19
	Grading	2/6/2023	3/3/2023	2023	18
	Building Construction	3/6/2023	6/6/2025	2023-2025	568
	Architectural Coating	12/8/2024	6/6/2025	2024-2025	128

**Notes:**

- <sup>1</sup>. Construction Schedule and Phasing information was provided by the Project Sponsor.  
<sup>2</sup>. Project construction will generally occur on Mondays through Fridays between the hours of 7AM and 5PM.

**Table 3**  
**Project Construction Diesel Equipment List**  
**The Station - East Tasman**  
**Santa Clara, CA**

Parcel	Construction Subphase <sup>1</sup>	Equipment Type <sup>2</sup>	Number <sup>2</sup>	Horsepower <sup>3</sup>	Hours/Day <sup>2</sup>	Utilization Percent <sup>2</sup>	Equipment Tier <sup>2</sup>
Parcel 19	Demolition	Concrete/Industrial Saws	1	81	8	25%	Fleet Average
		Excavators	1	247	8	75%	Fleet Average
		Tractors/Loaders/Backhoes	1	97	8	50%	Fleet Average
	Site Preparation	Excavators	2	187	8	80%	Fleet Average
		Tractors/Loaders/Backhoes	2	97	8	80%	Fleet Average
		Graders	1	187	6	85%	Fleet Average
	Grading	Plate Compactors	1	8	6	85%	Fleet Average
		Tractors/Loaders/Backhoes	1	97	7	50%	Fleet Average
	Building Construction	Cranes	1	231	6	50%	Tier 3
		Forklifts	1	89	6	50%	Tier 4
		Welders	1	46	8	15%	Fleet Average
		Generator Sets	1	84	8	50%	Tier 4
Parcel 29	Demolition	Concrete/Industrial Saws	1	81	8	25%	Fleet Average
		Excavators	1	247	1	80%	Fleet Average
		Tractors/Loaders/Backhoes	2	97	6	97%	Fleet Average
	Site Preparation	Excavators	1	187	8	80%	Fleet Average
		Tractors/Loaders/Backhoes	1	97	8	80%	Fleet Average
		Graders	1	81	8	85%	Fleet Average
	Grading	Plate Compactors	1	8	1	85%	Fleet Average
		Tractors/Loaders/Backhoes	2	97	6	75%	Fleet Average
	Building Construction <sup>4</sup>	Forklifts	2	89	6	65%	Tier 4
		Tractors/Loaders/Backhoes	2	97	8	35%	Tier 4
		Welders	1	46	7	15%	Fleet Average
		Generator Sets	1	84	8	50%	Tier 4

**Notes:**

- <sup>1</sup> Diesel equipment is not expected for the architectural coating phases of either parcel.
- <sup>2</sup> Information on Project equipment list, fuel type, quantity, utilization factor, and tier were provided by the Project Sponsor.
- <sup>3</sup> Equipment horsepower and load factor for each piece of equipment was obtained from CalEEMod® Appendix D.
- <sup>4</sup> Building construction of Parcel 29 will also involve the use of an electric crane.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODEL

**Table 4**  
**Project Construction Trips**  
**The Station - East Tasman**  
**Santa Clara, CA**

Parcel	Construction Subphase	Construction One-way Trips <sup>1</sup>		
		Average Worker Trips	Average Material Trips <sup>2</sup>	Hauling Trips
		trips/day	trips/day	trips/phase
Parcel 19	Demolition	8	0	90
	Site Preparation	8	0	3,000
	Grading	5	0	330
	Building Construction	150	0	1,000
	Architectural Coating	2	0	70
Parcel 29	Demolition	10	0	40
	Site Preparation	5	0	550
	Grading	10	0	100
	Building Construction	167	0	700
	Architectural Coating	33	0	70

**Notes:**

- <sup>1</sup>. Construction trip rates were provided by the Project Sponsor for each parcel. The number of haul trips was doubled for use in the model to represent the number of one-way trips.
- <sup>2</sup>. Material trips for Vendors are included in the number of hauling trips

**Table 5**  
**Project Construction Architectural Coating**  
**The Station - East Tasman**  
**Santa Clara, CA**

Coating Category	Interior	Exterior
VOC Content (g/L) <sup>1</sup>	100	150
Emission Factor (lb/ft <sup>2</sup> ) <sup>2</sup>	0.0046	0.0069
Land Use	Fraction of Surface Area Painted <sup>2</sup> (%)	Painted Area Multiplier <sup>2</sup>
Residential	75%	25%
Non-Residential	75%	25%
Parking	0%	6%

Parcel	Building	Building Square Footage <sup>3</sup>			Painted Areas		ROG Emissions
		Residential Area	Non-residential Area	Parking Area	Interior	Exterior	
		ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	tons
Parcel 19	Retail	--	15,790	--	23,685	7,895	0.082
	Apartment Mid Rise	280,700	--	--	568,418	189,473	2.0
	Parking	--	--	178,800	--	10,728	0.037
Parcel 29	Retail	--	8,000	--	12,000	4,000	0.042
	Apartment Mid Rise	237,905	--	--	481,758	160,586	1.7
	Parking	--	--	57,760	--	3,466	0.012
<b>Total</b>		518,605	23,790	236,560	1,085,860	376,147	<b>3.8</b>

**Notes:**

- <sup>1</sup> VOC content of paint is assumed to be consistent with BAAQMD Regulation 8, Rule 3. VOC is assumed to be equivalent to ROG for these purposes.
- <sup>2</sup> CalEEMod® default architectural coating emissions parameters.
- <sup>3</sup> Project square footage by land use was provided by the Project Sponsor.

**Abbreviations:**

BAAQMD - Bay Area Air Quality Management District	gal - gallons
CalEEMod® - California Emissions Estimator MODEL	L - liters
CEQA - California Environmental Quality Act	lb - pounds
ft <sup>2</sup> - square feet	ROG - reactive organic gas
g - gram	VOC - volatile organic compound

**References:**

- BAAQMD. 2009. Regulation 8 Rule 3 Architectural Coatings. July.
- California Air Pollution Control Officers Association (CAPCOA). 2016. Appendix A. Available at: <http://www.caleemod.com>

**Table 6**  
**Construction Model Emissions**  
**The Station - East Tasman**  
**Santa Clara, CA**

Emissions Source	Year	Emissions <sup>1</sup>			
		DPM <sup>2</sup>		PM <sub>2.5</sub> <sup>3</sup>	
		lb/yr	g/s	lb/yr	g/s
Parcel 19	2020	24	3.46E-04	23	3.35E-04
	2021	15	2.09E-04	15	2.09E-04
	2022	6.1	8.77E-05	6.1	8.79E-05
Parcel 29	2023	12	1.79E-04	12	1.70E-04
	2024	4.4	6.35E-05	4.4	6.37E-05
	2025	1.9	2.74E-05	1.9	2.74E-05
<b>Total</b>		<b>63</b>	<b>9.12E-04</b>	<b>62</b>	<b>8.92E-04</b>

**Notes:**

- <sup>1</sup>. Construction emissions were modeled annually between the hours of 7 AM and 5 PM with emission factor multipliers of 2.4 across all 10 active hours. Consequentially, emissions in grams per second shown above are averaged over 24 hours/day for 365 days/year.
- <sup>2</sup>. All PM<sub>10</sub> exhaust emissions are assumed to be diesel emissions.
- <sup>3</sup>. PM<sub>2.5</sub> emissions include both fugitive and exhaust emissions.

**Abbreviations:**

DPM - Diesel Particulate Matter

g/s - grams per second

lb/yr - pounds per year

PM<sub>2.5</sub> - particulate matter less than 2.5 microns in diameter

**Table 7**  
**Model Source Parameters**  
**The Station - East Tasman**  
**Santa Clara, CA**

Pathway	Description	Selection
Control	Averaging Time	Period average
	Model Version	AERMOD v18081
Construction Off-road Volume Sources <sup>1</sup>	Release Height	5 m
	Initial Lateral Dimension (ILD)	4.65 m
	Initial Vertical Dimension (IVD)	1.4 m
	Construction Duration	7 AM to 5 PM
On-road Line Sources <sup>2</sup>	Release Height	2.55 m
	Initial Vertical Dimension (IVD)	2.37 m
	Emissions Rate	Variable
Receptors <sup>3</sup>	Gridded Receptor Height	1.80 m
	Grid	20 m spacing to 1000 ft from Project boundary and 10m spacing within the Project boundary
Meteorology	Surface Data	San Jose International Airport (KSJC)
	Upper Air	Oakland International Airport

**Notes:**

- <sup>1</sup> Off-road source parameters based on South Coast Air quality Management District Localized Significance Threshold methodology (SCAQMD 2008).
- <sup>2</sup> On-road source parameters based on United States Environmental Protection Agency (USEPA) Haul Road Working Group guidance (USEPA 2012).
- <sup>3</sup> Receptor flag pole height is consistency with Bay Area Air Quality Management District (BAAQMD) guidance (BAAQMD 2017).

**Abbreviations:**

AERMOD - American Meteorological Society/Environmental Protection Agency Regulatory Model  
BAAQMD - Bay Area Air Quality Management District  
CEQA - California Environmental Quality Act  
ft - feet  
LST - Localized Significance Threshold  
m - meters

**References:**

Bay Area Air Quality Management District (BAAQMD). 2017. California Environmental Quality Act (CEQA) Air Quality Guidelines. May. Available at: [http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa\\_guidelines\\_may2017-pdf.pdf?la=en](http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en)

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**Table 8**  
**Exposure Parameters**  
**The Station - East Tasman**  
**Santa Clara, CA**

Receptor Type	Exposure Start Date <sup>1</sup>	Receptor Age Group	Exposure Parameters <sup>6</sup>					
			Daily Breathing Rate (DBR) <sup>2</sup>	Exposure Duration (ED) <sup>3</sup>	Fraction of Time at Home (FAH) <sup>4</sup>	Exposure Frequency (EF) <sup>5</sup>	Averaging Time (AT)	Intake Factor, Inhalation (IF <sub>inh</sub> )
			L/kg-day	years	unitless	days/year	days	m <sup>3</sup> /kg-day
Resident	1/1/2020	3rd Trimester	361	0.25	1	350	25,550	0.0012
		Age 0-<2 Years	1,090	2.0	1			0.030
		Age 2-<9 Years	631	3.75	1			0.032
	1/1/2023	3rd Trimester	361	0.25	1	350	25,550	0.0012
		Age 0-<2 Years	1,090	2.0	1			0.030
		Age 2-<9 Years	631	0.75	1			0.0065

**Notes:**

- Two scenarios were analyzed to capture the highest impact of construction on nearby residents:  
 Scenario 1: Exposure starting at the beginning of construction of the midrise building and exposure to construction emissions for both buildings (offsite receptors only).  
 Scenario 2: Exposure starting at the beginning of construction of the highrise building and no exposure to the midrise building construction (offsite receptors and onsite receptors in the midrise building).
- Daily breathing rates reflect default breathing rates from Cal/EPA 2015 as follows:  
 95th percentile 24-hour daily breathing rate for age 3rd trimester and 0-<2 years  
 80th percentile 24-hour daily breathing rate for age 2-<9 years
- The exposure duration represents the exposure for each age group type.
- Fraction of time spent at home is conservatively assumed to be 1 (i.e. 24 hours/day).
- Exposure frequency was determined as follows:  
 Residents: reflects default residential exposure frequency from Cal/EPA 2015.
- No modeling adjustment factor was applied because only residents were evaluated.

**Calculation:**

$$IF_{inh} = DBR * FAH * EF * ED * CF / AT$$

$$CF = 0.001 \text{ (m}^3\text{/L)}$$

**Abbreviations:**

AT - averaging time  
 Cal/EPA - California Environmental Protection Agency  
 DBR - daily breathing rate  
 ED - exposure duration  
 EF - exposure frequency

FAH - fraction of time at home  
 IF<sub>inh</sub> - intake factor, inhalation  
 kg - kilogram  
 L - liter  
 m<sup>3</sup> - cubic meter

**Reference:**

Cal/EPA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

**Table 9**  
**Carcinogenic and Noncarcinogenic Toxicity Values**  
**The Station - East Tasman**  
**Santa Clara, CA**

Chemical <sup>1</sup>	CAS Number	Cancer Potency Factor	Chronic Reference Exposure Level
		[mg/kg-day] <sup>-1</sup>	µg/m <sup>3</sup>
Diesel particulate matter	9901	1.1	5

**Abbreviations:**

ARB - Air Resources Board

Cal/EPA - California Environmental Protection Agency

CAS - chemical abstract services

mg/kg-day - milligrams per kilogram per day

OEHHA - Office of Environmental Health Hazard Assessment

µg/m<sup>3</sup> - micrograms per cubic meter

**Reference:**

Cal/EPA. 2016. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. March. Available at: <http://www.arb.ca.gov/toxics/healthval/contable.pdf>.

**Table 10**  
**Age Sensitivity Factor<sup>1</sup>**  
**The Station - East Tasman**  
**Santa Clara, CA**

Receptor Type	Receptor Age Group <sup>2</sup>	Value <sup>3</sup>
All Receptors	3rd Trimester	10
	Age 0-<2 Years	10
	Age 2-<9 Years	3

**Notes:**

- <sup>1</sup>. Age sensitivity factors account for an “anticipated special sensitivity to carcinogens” of infants and children as recommended in the OEHHA Technical Support Document (Cal/EPA 2009) and current OEHHA guidance (Cal/EPA 2015). This approach is consistent with the cancer risk adjustment factor calculations recommended by BAAQMD (BAAQMD 2016).
- <sup>2</sup>. Adjustment factor is applicable to each receptor type listed for the age group relevant to that receptor type as identified in Table 9 Exposure Parameters.
- <sup>3</sup>. Age sensitivity factor is unitless.

**Abbreviations:**

ASF - Age-Specific Sensitivity Factor  
 BAAQMD - Bay Area Air Quality Management District  
 Cal/EPA - California Environmental Protection Agency  
 OEHHA - Office of Environmental Health Hazard Assessment

**References:**

BAAQMD. 2016. Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.

Cal/EPA. 2009. Technical Support Document for Cancer Potency Factors: Methodologies for Derivation, Listing of Available Values, and Adjustment to Allow for Early Life Stage Exposures. May. Available online at: [http://oehha.ca.gov/air/hot\\_spots/2009/TSDCancerPotency.pdf](http://oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf).

Cal/EPA. 2015. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August. Available at: [http://www.oehha.ca.gov/air/hot\\_spots/pdf/HRAguidefinal.pdf](http://www.oehha.ca.gov/air/hot_spots/pdf/HRAguidefinal.pdf)

**Table 11**  
**Construction Criteria Air Pollutant Emissions**  
**The Station - East Tasman**  
**Santa Clara, CA**

Total CAP Emissions						
Phase	Year	Source	Emissions <sup>1</sup>			
			ROG	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
			lbs			
Parcel 19	2020	Off-road Equipment	55	580	24	23
	2021		35	357	14	14
	2022		14	150	5.7	5.7
Parcel 29	2023		41	268	12	12
	2024		27	131	4.2	4.2
	2025		12	56	1.7	1.7
Parcel 19	2020	On-road Trucks and Vehicles	125	916	61	31
	2021		114	181	45	19
	2022		45	74	19	8.2
Parcel 29	2023		0	0	0	0
	2024		1	2	1	0
	2025		8	14	4	1.8
Parcel 19	2022	Architectural Coating	4,188	--	--	--
Parcel 29	2025	Off-Gassing <sup>2</sup>	3,454	--	--	--
<b>Total Emissions (lbs)</b>			<b>8,120</b>	<b>2,728</b>	<b>192</b>	<b>121</b>

Total Combined Project Emissions				
Year	Emissions <sup>3</sup>			
	ROG	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	lbs/day			
2020	0.72	6.0	0.34	0.22
2021	0.59	2.1	0.24	0.13
2022	39	2.1	0.23	0.13
2023	0.16	1.1	0.050	0.047
2024	0.12	0.53	0.019	0.018
2025	31	0.62	0.055	0.032
Significance Threshold	54	54	82	54
<b>Exceed Threshold?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**Notes:**

- Emissions were estimated using methodology consistent with CalEEMod® and the equipment, schedule, and trip counts provided by the Project Sponsor. See Tables 2-4 for more information.
- Architectural Coating emissions are calculated in Table 5. It was conservatively assumed architectural coating would occur in 2022 for Parcel 19 and 2025 for Parcel 29.
- Pounds per day emissions were calculated by dividing annual emissions by the number of work days. Annual number of work days was assumed to be 250 days/year for 2020-2021 and 2023-2024. For 2022 and 2025, annual number of work days corresponds to the actual number of work days since construction would occur for less than a year.

**Abbreviations:**

BAAQMD - Bay Area Air Quality Management District

CAP - criteria air pollutant

CalEEMod® - California Emissions Estimate Model

CAPCOA - California Air Pollution Control Officers Association

CEQA - California Environmental Quality Act

lb - pound

NO<sub>x</sub> - oxides of nitrogen

PM<sub>10</sub> - particulate matter less than 10 µm

PM<sub>2.5</sub> - particulate matter less than 2.5 µm

ROG - reactive organic gas

**References:**

California Air Pollution Control Officers Association (CAPCOA). 2016. CalEEMod. Available at: <http://www.caleemod.com>.

**Table 12**  
**Maximum Project Excess Lifetime Cancer Risk, Chronic HI, and PM<sub>2.5</sub> Concentration on Offsite and Onsite Receptors**  
**The Station - East Tasman**  
**San Mateo, California**

Receptor Type	UTMx	UTMy	Lifetime Excess Cancer Risk <sup>1</sup>	Chronic HI <sup>1</sup>	PM <sub>2.5</sub> Concentration <sup>1</sup>
	m	m	in a million	unitless ratio	µg/m <sup>3</sup>
Offsite Resident	591,660	4,140,740	9.1	0.014	0.034
Onsite Station Resident	591,680	4,140,670	6.6	0.0097	0.031
Offsite Station Resident <sup>2</sup>	591,720	4,140,680	8.4	0.025	0.054
Significance Threshold			10	1	0.30
<b>Exceed Threshold?</b>			<b>No</b>	<b>No</b>	<b>No</b>

**Notes:**

- <sup>1</sup>. Impacts are shown at the maximally exposed individual residential receptor.
- <sup>2</sup>. If the offsite parcels of The Station are built out directly southeast of the Project before Parcel 19 construction begins, a Tier 4 or Tier 4 equivalent crane must be used to reduce cancer risk below the significance threshold. The cancer risks shown here assumes a Tier 4 crane was used.

**Abbreviations:**

HI - Hazard Index

m - meter

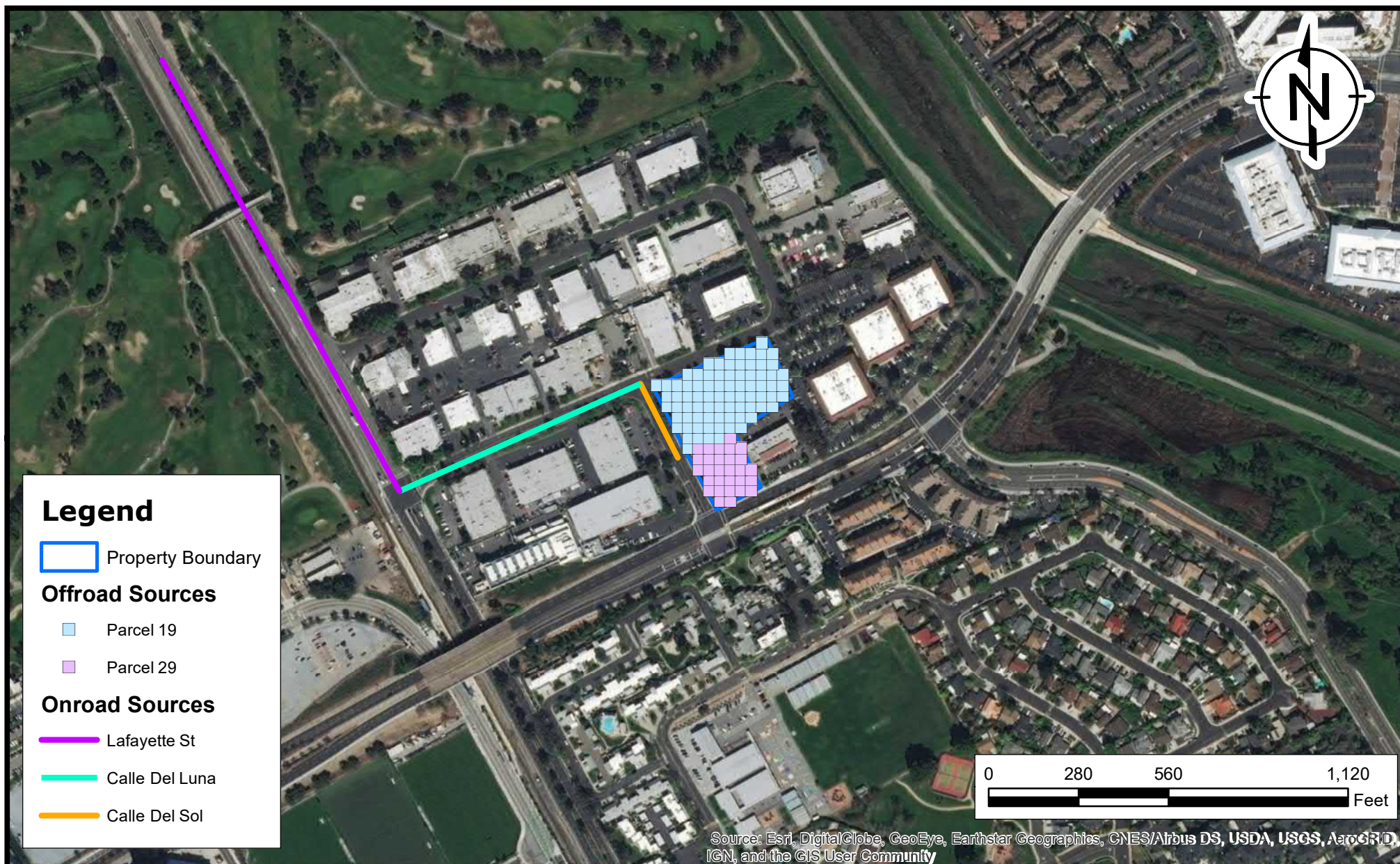
PM<sub>2.5</sub> - particulate matter with an aerodynamic diameter of 2.5 microns or less

µg/m<sup>3</sup> - microgram per cubic meter

**DRAFT**

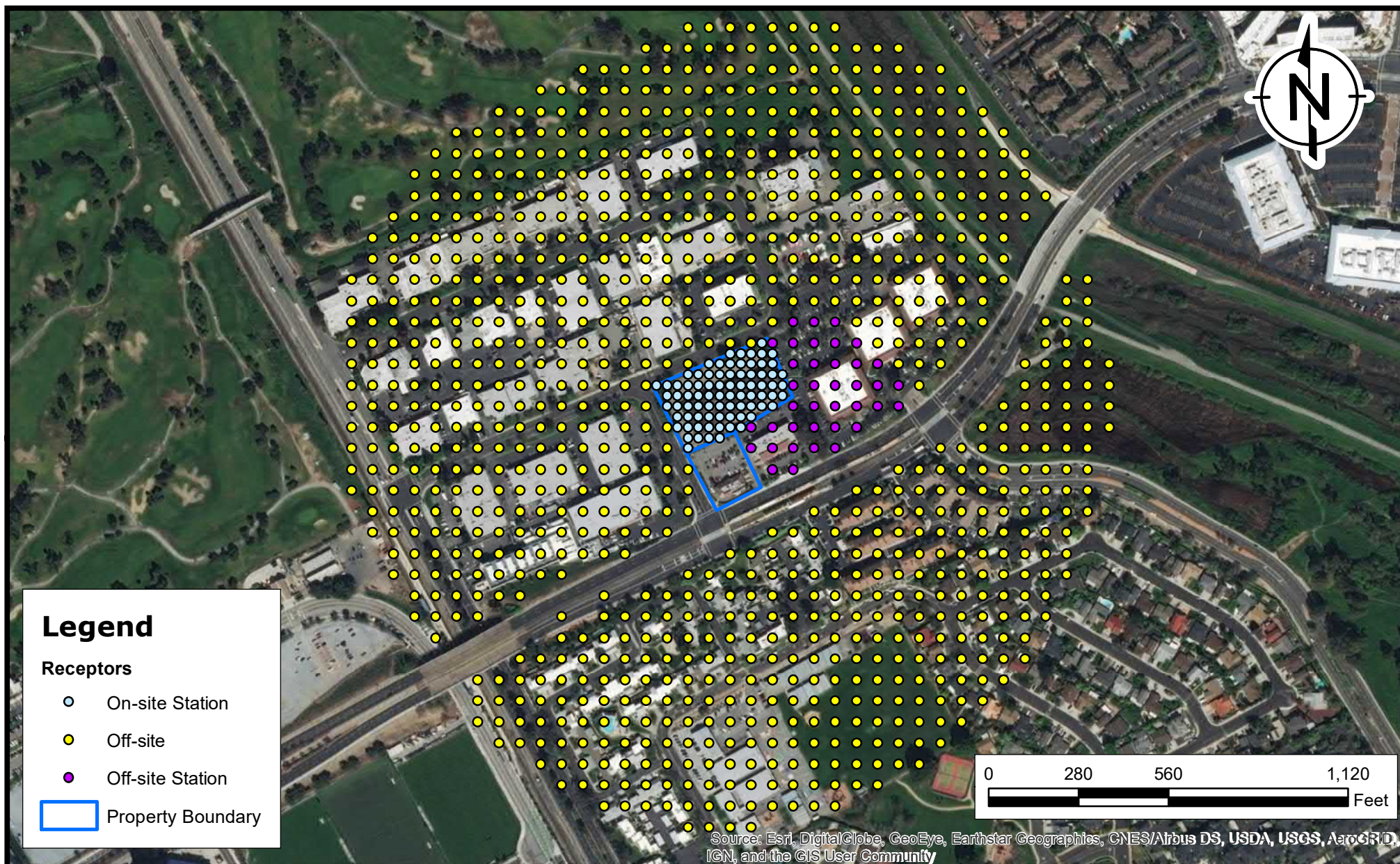
The Station – East Tasman  
Air Quality Technical Report – Construction Analysis

## **FIGURES**



**Construction Sources**  
**The Station - East Tasman Specific Plan**  
**Santa Clara, California**

**FIGURE**  
**1**



**Receptor Locations**  
**The Station - East Tasman Specific Plan**  
**Santa Clara, California**

**FIGURE**  
**2**